REPORT

Revised Recommended Draft Action Plan
Integrated Solid Waste Management Plan

County of Kaua‘i, Hawai‘i

MARCH 2007

R·W·BECK

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1.1 Overview

In January of 2006, the County of Kaua‘i began the process of updating its integrated solid waste management plan (ISWMP or Plan). Kaua‘i’s previous ISWMP was prepared in 1994. The purpose of the updated ISWMP is two-fold. First, the ISWMP must comply with the State of Hawai‘i Solid Waste Management Act of 1991 (State Act) that requires Hawai’i counties to manage solid waste by following these priorities:

- First, reduce the amount of waste generated;
- Second, recycle and compost materials; and
- Third, landfill and incinerate the remaining materials.

The State Act also established the goal that 25 percent of the solid waste stream was to be diverted from landfilling and incineration by 1995, and 50 percent of the waste stream should be diverted by 2000.

Second, the Plan should embrace a specific set of Kaua‘i-specific guiding principals that were identified through a series of public meetings and by the Solid Waste Advisory Committee established by the Mayor. These guiding principals include:

- **Increase diversion** – Between 1994 and 2005, the County increased diversion from the Kekaha Landfill (Landfill) from a reported quantity of approximately 3 percent[1] to almost 24 percent. While the County did not achieve the State Act’s goal, this is a significant increase that the County, as well as it residents and businesses, should take pride in accomplishing. This updated ISWMP includes mechanisms to enhance the performance of existing waste diversion programs, identifies new waste streams to target for diversion, provides funding for innovative diversion programs and explores new technologies to further reduce reliance on landfill and incineration. By 2013, the County is projected to increase upstream diversion to 35 percent.
- **Minimize cost to the County and customers** – As detailed in Section 13, the County’s FY 2007 solid waste management program operating and management expenditures are approximately $11.6 million, which is approximately 8 percent of the County’s total public works operating expenditures for FY 2007. While the ISWMP identifies strategies to aggressively divert waste and retain high levels of

[1] More recycling was most likely occurring at that time, but was not quantified.

customer satisfaction, these strategies will be balanced with sound financial management practices that include:

- Identifying opportunities to increase efficiencies and reduce costs of solid waste management operations;
- Targeting waste streams, such as green waste, that potentially yield the greatest diversion quantities for the dollars invested;
- Facilitating "buy recycled" initiatives amongst Hawaii counties to increase the value and reduce the cost of recycling materials; and
- Working with the State to introduce legislation that places some responsibility for management of the materials on the manufacturers of various consumer products (e.g. electronics).

- **Establish a direct relationship between the scope of the services provided and the fees charged (i.e., user fee) to promote equity among customers** – Because residents pay for solid waste collection and disposal services through the general fund, a limited correlation currently exists between creating large amounts of solid waste and the environmental and economical costs associated with managing solid waste. Therefore, the ISWMP includes recommendations to assess a residential solid waste user fee for solid waste management services, and assess a higher fee to residents who choose to dispose large quantities of solid waste rather than participate in the County's waste diversion programs.
- **Promote sustainability** – To promote sustainability, the Plan includes strategies to:
  - Limit the use of products made from mined or harvested natural resources by increasing recycling and composting and increase the use of recycled content materials;
  - Reduce reliance of fossil fuels by using solid waste to create energy;
  - Create a financial incentive to produce less solid waste;
  - Assure that residents have convenient and affordable mechanisms to properly manage solid waste rather than dispose of it on the land and waters of Kaua'i; and
  - Prevent materials such as electronics and household hazardous waste (HHW) from being managed in communities that lack adequate regulations to protect human and environmental health.
- **Facilitate the development of small business** - Small businesses play an integral part of the Kaua'i community. The ISWMP will foster the development of small businesses through technical and financial assistance to provide innovative recycling and composting programs to Kaua'i. The ISWMP also includes policies to aggressively divert commercially generated materials such as corrugated cardboard and green waste. The small businesses of Kaua'i will play a critical role in identifying the most effective and equitable processes for instituting these

policies. Lastly, developing of local markets for end-use of the recycled materials will be a priority.

- **Increase participation in solid waste diversion programs** - Dr. Doug McKenzie-Mohr in his book "Fostering Sustainable Behavior"[2] notes that promoting environmental values through extensive education such as brochures, workshops, and pamphlets or identifying economic savings, may change *attitudes* towards an environmental issue without markedly changing people's *behavior*. Cultural, social, emotional, and technological barriers must be identified and overcome in order to make change in behavior occur. The means by which this is completed is referred to as community-based social marketing and involves several steps:

  1. Determining the impact and probability of activities to be promoted and targeting appropriate behaviors;
  2. Identifying benefits and barriers to sustainable behavior through research, observation, surveys, and focus groups;
  3. Designing a strategy that utilizes behavior change tools;
  4. Piloting the strategy with a small segment of the community; and
  5. Evaluating the program once it has been implemented across the community.

To maximize participation in the County's waste diversion programs, the County will implement community based social marketing strategy as described above whenever possible.

1.2 Development of the Plan

In February of 2006, three public meetings were conducted to inform Kaua'i residents and businesses about the planning process and obtain their perspective on what is working with the County's solid waste management system and what would they like to see the Plan address.

To further identify key issues that the Plan should address the Mayor appointed the SWAC members, which included the following representatives:

- Jean Camp, Resident
- Jeffrey Deren, Kaua'i Island Utility Cooperative
- Jeff Kaohi, Resident
- Ray Maki, Permaculture Kaua'i
- Bill Cowern, Kaua'i County Farm Bureau
- Larry Dill, Princeville Operating Company, LLC
- Mike Furukawa, Grove Farm Properties
- Steven Kaui, Garden Isle Disposal

[2] For a more detailed discussion of this material, the entire book can be found online at www.cbsm.com.

- Keith Nitta, Kaua'i County Planning Department
- Lane Otsu, State of Hawai'i Department of Health
- Glenn Sato, Kaua'i Office of Economic Development
- Rhoda Libre, Kaua'i Westside Watershed Council
- James Trujillo, Resident
- Diane Zachary, Kaua'i Planning and Action Alliance
- Kathleen West-Hurd, Resident

Between February and November of 2006, the SWAC convened eight times to discuss various issues associated with the ISWMP. To broaden the internal and external solid waste planning objectives, the SWAC meetings were supplemented with a County Council work session in December 2005. Finally, all reports that were submitted to the SWAC were posted on the County's website, along with all SWAC meeting minutes and agendas.

1.3 Key Waste Collection and Upstream Diversion[3] Action Items

Based on the State Act and the guiding principals, following is a five-year chronological approach for implementing the ISWMP[4]. As shown below, the majority of new upstream diversion programs, policies and strategies are scheduled to begin within the first four years of Plan implementation. The County has chosen this aggressive schedule because the Kekaha Landfill is projected to reach capacity by 2013. To site, finance, permit, develop and construct a replacement solid waste facility is likely to require at least five years. Therefore, maximizing diversion can extend the operating life of the existing facility until additional capacity becomes available.

Detailed information on diversion programs for five years is provided below. The projected annual impact on diversion quantities and County expenditures are provided in Table 1-1 and 1-2, respectively. Please note that the estimated expenditures represent planning level costs. The aggregate annual impact on disposal requirements is shown in Table 1-3.

1.3.1 Year 1

1.3.1.1 Administration

- Add staff - Currently the County-funded Solid Waste Management Division's administrative staff includes a solid waste programs administrator, recycling

[3] Upstream Diversion is defined as diversion that occurs at the point of generation or where the generator participates in the diversion process.
[4] The State Act requires that solid waste management plans be updated every 5 years.

coordinator, contract specialist, collection coordinator and clerk5. To fully implement the ISWMP, we recommend the County expand the solid waste staff during the first year of Plan implementation to include:

- A deputy assistant to the solid waste programs administrator to oversee Plan implementation that includes assisting in the procurement of service providers, siting of solid waste facilities, communicating with other County offices and the State Department of Health (DOH), preparation of program budgets and evaluating Plan performance;
- A business waste diversion specialist to work with businesses and the hospitality industry to increase recycling, focus on business education and outreach, special events recycling, develop County procurement policies, manage and promote the Aloha Shares Network, modify County ordinances to facilitate business recycling, design and institute a tourist recycling program, and enforce bans targeted toward business; and
- A collection specialist to coordinate and oversee the implementation of the automated collection system and the institution of curbside green waste collection. This individual will be responsible for reconfiguring collection routes, procuring new vehicles and carts, overseeing the development of ordinances to support the new collection systems, training collection crews and fleet maintenance personnel and managing the education of County customers and stakeholders.

- Establish a solid waste collection fee of $12.00 per household per month. There would be no limit on the number of containers set out by customers until all of the routes are converted to automated collection at the end of YR 3 and curbside recycling is available in YR 4. The fee would be established to recover a portion of the costs incurred to provide solid waste service to County residents. The level of the fee should be based on affordability issues balanced with a strategy to recover the full costs of service over time. Starting in YR 4, customers will be allowed to set out only one 96-gallon cart and an additional fee will be implemented for residential customers who require additional solid waste collection services. More information on this Pay-As-You-Throw system is provided in YR 4 action items.

1.3.1.2 Source Reduction

As previously discussed, reducing the amount of solid waste generated is the State's preferred method for managing solid waste. Currently, County agencies have an increased awareness of waste diversion issues through ongoing participation in the County's office paper recycling program. Many opportunities are available for residents and businesses to reuse items or reduce solid waste rather than producing solid waste. These opportunities include:

[5] A bottle redemption coordinator works for the County, but is funded by the State.

- Thrift Stores;
- Habitat for Humanity;
- Trade Radio on KONG AM 570;
- Kaua‘i Food Bank;
- Aloha Shares Network;
- Home Composting; and
- Education.

The County will continue to facilitate or provide source reduction opportunities to the residents and businesses of Kaua‘i. Specific initiatives include:

- Proactively promote the Aloha Shares Network; and
- Enhance the backyard composting campaign.

1.3.1.3 Collection

The County is responsible for the curbside collection of municipal solid waste (MSW) from all single-family residences in the County (17,863 households in FY 2005; includes some smaller multi-family dwelling buildings[6]). The County collects solid waste once a week using six rear-load collection vehicles. The refuse is collected manually and each collection vehicle has one driver and two laborers. Communities throughout the United States, including Honolulu and Maui, are converting from manual collection to automated collection. In an automated collection system, residents are provided with wheeled, plastic refuse carts and the carts are collected with vehicles that are designed to limit the amount of physical labor used to place the solid waste into the collection vehicle. Communities are converting to this type of system to reduce litter, minimize costs, improve efficiency and limit worker injuries.

The Plan recommends that the County begin the transition from manual to automated collection as follows:

- The County will phase in automated collection in each of the five collection districts between YR 1 and YR 3. Converting to an automated collection system will reduce staffing requirements for solid waste collection by one laborer per crew. The County will re-assign that individual to the curbside green waste collection;
- The County plans to automate just the Lihue area in YR 1;
- The County will conduct a collection and fleet maintenance efficiency study; and

[6] The County conducted a customer audit in 2006, and identified an additional 5,000 customers. These additional customers are reflected in the 2007 household estimates.

- The County will contract with a professional firm to manage the implementation of the automated collection program.

1.3.1.4 BioConversion

The County presently provides five locations where residents may drop off their green waste at no charge. Businesses can drop-off green waste for a fee.

The County contracts with two private firms to provide grinding services, producing mulch which is available for landscaping. These facilities also accept green waste from private waste haulers, businesses and landscapers. In 2005, a total of 11,648 tons of County-collected green waste and approximately 4,000 tons of privately-collected green waste were handled by these facilities. In addition, the County bans the landfill disposal of refuse loads from businesses, industries, governments, institutions and other non-residential sources that exceed 20 percent green waste.

While the current green waste program and policies are estimated to be diverting approximately 70 percent of the green waste that is generated, over 5,000 tons of green waste is estimated to have been disposed in FY 2005. In addition, as more people move to Kaua'i from communities with curbside green waste collection, they may be less likely to transport their green waste to a transfer station and instead, will choose to include this material with their general solid waste. Finally, it is estimated that over 8 percent of the commercial waste stream is comprised of green waste. This may be an indicator that limiting the commercial green waste at the Landfill may not be sufficient. Therefore, in YR 1, we recommend the County:

- Enact legislation banning the use of plastic bags for setting out green waste at the curb to facilitate material handling;
- Require residents and businesses to limit the drop-off of only incidental amounts[7] of commercial and residential green waste at the transfer stations and the Landfill; and
- Begin providing weekly curbside green waste collection services in collection districts that have been converted to automated collection. An estimated third of the operating costs associated with providing every week green waste collection is likely to be off-set by the projected savings from converting to automated solid waste collection.

In addition to instituting curbside green waste collection, the County will aggressively promote the use of backyard composting bins as an alternative to residents keeping their green waste for two weeks between collections, as well as promoting the benefits of using green waste mulch and compost at home.

[7] The County will work with internal and external stakeholders to define "incidental".

1.3.1.5 Recycling

Drop-Bin Program

The County has numerous programs in place to divert reusable and recyclable materials from landfill disposal. These programs have contributed to a County recycling rate in 2005 of approximately 24 percent. The majority of residential recyclables are collected via the County's drop-bin program. Currently there are eight drop-off sites in the County for the collection of the following items generated by residents (commercially-generated materials are not accepted in the bins):

- Cardboard
- Newspaper
- Glass
- Aluminum Cans
- Plastic bottles (#1 and #2)
- Junk mail (Mixed Paper)

A program gap in the drop-bin program that was identified during the public meetings and by the SWAC is that all transfer stations should have a recycling drop-bin. Currently only the Hanalei Transfer Station and the Kekaha Landfill have a recycling drop-bins. Because the transfer stations have a high volume of residential traffic, the potential exists to divert a significant amount of additional materials. Therefore, the Plan recommends that the County add drop-bins at the Kapaa and Hanapepe Transfer Stations. The County may add a drop bin at the Lihue transfer station if the KRC does not become operational. It should be noted that siting drop-bins at these facilities will require the County to reconfigure the site layout at each facility and modify how green waste is handled.

Business Recycling

In addition to adding recycling drop-bins at the transfer stations, we recommend the County modify its ordinances to allow commercial establishments to use the drop-bin program if Kaua'i Resource Center (KRC) does not resume operations. Businesses would be limited to the amount of material they could bring during a 24-hour period (i.e., one pick-up load). This will reduce the overflowing of recycling drop-bins. Due to the expected increase in volumes of material, the County's annual budget to service the drop-bins at sites in commercially developed areas, such as Kapaa, is projected to double in YR 1. Finally, through the hiring of a business recycling specialist, the County will implement a comprehensive business waste reduction/recycling program.

Once the business program is fully operational, the County will work with the business community to modify existing ordinances to:

- Require businesses of a certain size or producing a minimum amount of recyclable material to establish recycling programs for glass, cardboard, office paper and green waste;
- Prohibit the disposal of commercially-generated cardboard, green waste, and glass at the transfer stations (with minimum amount in loads defined);
- Define the amount of cardboard in a commercial load that is banned from disposal (i.e., loads containing a minimum of 1 cubic yard loose old corrugated cardboard);

- Modify ordinance penalty fees;
- Restructure commercial tipping fees at the Landfill and transfer stations to encourage recycling; and
- If an affordable recycling processing option is available, all waste haulers will be required to obtain a license from the County with a provision that in order to receive a license, recycling services must be provided to commercial customers.

Enhance Bottle Bill Program

Based on a waste composition study conducted by the County in February 2006, approximately 2.4 percent of the waste stream was comprised of deposit containers, which is equivalent to over 2,000 tons of deposit containers. When public meetings were conducted during the same month, frustration about the location and operating hours of the redemption centers was a key public issue. Improving the performance of the bottle bill redemption program will include priority initiatives such as pursuing the redesign of the transfer stations to facilitate the location of redemption centers at transfer stations.

1.3.1.6 Special Waste Management

Special wastes are those components of the waste stream that require special handling due to their size or physical, chemical or biological composition for proper processing or disposal. Special wastes, as defined by Hawaii State Law H.B. 324 include:

- Asbestos;
- Agricultural wastes;
- Infectious medical wastes;
- Abandoned/derelict vehicles;
- Sewage sludge;
- Waste combustion ash;
- White goods;
- Tires;
- Used motor oil; and
- Lead acid batteries.

Also generally regarded as special waste, although not specifically mentioned in H.B. 324, are:

- Household batteries;
- Propane tanks; and
- Used cooking oil.

Currently, there are programs available to manage these special wastes and the County will not institute any new initiatives in YR 1. However, strategies to improve the

effectiveness and convenience of some programs will be introduced in subsequent years.

1.3.1.7 Electronics/HHW Management

At this time, no businesses that accept electronic waste or e-waste for recycling are located in the County. In the past, KRC operated by Island Recycling (based in Honolulu) accepted monitors and central processing units (CPUs) for recycling. In fiscal year 2005, approximately 38 tons of electronics were collected at the KRC. In an effort to continue to divert e-waste in the short term, the County will provide an annual electronic waste collection event, and will continue to recover HHW through special collection events. In the long-term, the County will develop a permanent facility for electronics and HHW. Please see action items based in YR 4.

1.3.1.8 Education

The County's estimated visitor population is over 8 million people per year, which has a substantial impact on the quantity of solid waste produced. To encourage visitors to recycle, as well as remind them of their responsibility to help protect the land, water and air, the County will work with the Kaua'i Visitor's Bureau and a professional advertising firm to design and implement an environmental advertising campaign. The County will also ensure that recycling opportunities are available at tourist destinations. Finally, the County will work extensively with the hospitality industry to encourage "green behavior" while on the island of Kaua'i.

Another education component will be required when the County phases in automated collection in each of the five collection districts between YR 1 and YR 3. The residents, as well as County employees, will need to be educated on the automated solid waste and green waste collection programs.

1.3.1.9 Market Development

Fran McPoland, the White House coordinator of the first America Recycles Day stated "If you are not buying recycled, you are not recycling". While considered an overly assertive statement by some, it brought national attention to the dilemma that sustainable markets for recyclable materials must be developed if recycling was to remain successful. To increase markets for recycled-content materials, we recommend the County strengthen its recycled product procurement policies and practices. For example, the County should consider offering a price advantage during competitive bid solicitations or provide a source of funding to cover the difference between recycled products and conventional products.

1.3.2 Year 2

1.3.2.1 Source Reduction

- Begin working with other Hawai'i counties to introduce Extended Producer Stewardship legislation in Hawai'i.[8]
- Institute a new campaign to promote backyard composting of green waste and purchase more compost bins.

1.3.2.2 Collection

- Convert the Kapaa and North Shore collection districts to automated refuse collection.

1.3.2.3 Bioconversion

- Begin providing curbside collection of green waste in the Kapaa and North Shore collection districts.

1.3.2.4 Recycling

- Institute an innovative recycling grant for private businesses, communities, and non-profit organizations. Examples of possible grant categories include: buy-recycled promotions, capital assistance funds, market development, and education and outreach initiatives.
- Evaluate procuring point of generation recycling collection for commercial establishments.

1.3.2.5 Special Waste Management

- Disseminate information to medical establishments and pharmacies on the proper handling of sharps.

1.3.2.6 Electronics/HHW Management

The County provides annual collection events for residents to drop-off household hazardous Waste (HHW) materials, free of charge, at all four County transfer stations. Commercial and institutional waste is not accepted. Although commercial and institutional hazardous waste is banned from landfill disposal, the 2006 waste characterization study indicated that over 230 tons of commercial hazardous wastes are annually disposed. In addition over 270 tons of residential HHW materials are annually disposed. To address this issue, the County will:

- Consider increasing the frequency of the collection events if the participation focus groups indicate this is a barrier to participation; and

[8] Product stewardship is a principal that directs all those involved in the life cycle of a product to take shared responsibility for reducing the health and environmental impact that result from the production, use and end-of-life management of the product.

- Allow farmers and commercial establishments to bring HHW to collection events for a fee. The County will require these generators to pre-register with the County and make appointments for the delivery of these materials.

1.3.2.7 Education

- Develop and implement a program to facilitate waste reduction and recycling at special events. The County has already begun to proactively address special event recycling.
- Promote "food waste to animal feed" programs to local farmers and restaurants. Local pig farmers currently collect food waste from certain local hotels, restaurants and the County jail to use as feedstock. However, the tracking of these waste diversion activities has not been consistent. A formal tracking system will be implemented by the County through collaboration with the generators and farmers.
- Educate Kapaa and North Shore residents on automated collection and green waste collection.

1.3.2.8 Market Development

- Conduct workshops with the building industry on Leadership in Energy and Environmental Design (LEED) certification and vendors of green building products.

1.3.3 Year 3

1.3.3.1 Administration

- Determine process for updating the ISWMP and gather preliminary data.

1.3.3.2 Source Reduction

- Encourage residents to purchase products, such as cleaning products, with minimal health or environmental hazards.
- Educate residents on the environmental and economic costs associated with the generating and management of solid waste.
- Work with the schools to incorporate source reduction education into the curriculum.
- Begin developing Unit Based/Pay-As-You-Throw pricing policies and educational materials for program implementation.

1.3.3.3 Collection

- Convert the Koloa-Poipu-Kalaheo and West Side collection districts to automated collection.

1.3.3.4 Bioconversion

- Begin providing curbside collection of green waste in the Koloa-Poipu-Kalaheo and West Side collection districts.

1.3.3.5 Recycling

- Initiate the competitive procurement process for every-other-week curbside collection services for County residents. This service will include the provision of recycling containers to residents, as well as collecting, processing and marketing the materials. Residents will not be charged for the service, but will be required to actively participate if they subscribe for the service. Residents will have the opportunity to subscribe several times a year. If the contactor indicates that a household is not participating, the County will contact the homeowner to provide notice that the service may be discontinued. The County will work with the Contractor and representatives of residential customers to define "not participating".

1.3.3.6 Special Waste Management

- Evaluate co-composting of biosolids at the centralized composting facility.

1.3.3.7 Electronics/HHW Management

- Identify a site for a permanent electronics/HHW collection facility, and procure vendor(s) to transport and manage electronics and HHW .

1.3.3.8 Education

- Educate Poipu and West Side residents on automated collection and green waste collection.
- Provide technical assistance to private facilities on food waste composting.
- Conduct benefits/barriers analysis to determine why residents participate or do not participate in upstream diversions programs.
- Develop a new campaign to promote the residential, curbside recycling program based on the incentive/barriers analysis.

1.3.3.9 Market Development

- Conduct a feasibility study to identify concerns and barriers associated with the large scale composting of organic waste materials. The main producers of commercial compost and mulch in the County use green waste collected at transfer stations as well as materials directly hauled to their facilities. These operations could make use of additional waste materials, potentially including pre-consumer food waste, pallets, non-treated wood debris from construction sites and gypsum. However, each of these waste streams presents unique obstacles and/or concerns.

1.3.4 Year 4

1.3.4.1 Administration

- Begin updating ISWMP.

1.3.4.2 Source Reduction

- Institute a hybrid Pay-As-You-Throw (PAYT) collection program whereby all residents pay an additional incremental fee if they require more than one cart for weekly refuse collection. In addition, for large general solid waste items[9] that cannot be contained in a cart, residents will annually receive a specified number of tags (i.e., 24 per year). Additional tags would need to be purchased from the County.

1.3.4.3 Bioconversion

- Identify a site for a joint centralized composting and disaster debris staging/disposal facility.

1.3.4.4 Recycling

- Institute an every-other-week residential curbside recycling program through a contract with a recycling vendor. Due to the implementation of the PAYT program, it is estimated that 70 percent of the households will participate and each participating household will set out approximately 400 pounds of recyclable materials annually[10] and divert approximately 3,500 tons of material.
- Evaluate the need for all of the recycling drop-bin sites.

1.3.4.5 Electronics/HHW Management

- Begin operating a permanent electronics/HHW collection facility. The County will contract with a private vendor(s) to transport and manage the electronics and HHW. The facility will only serve ass a temporary staging area for these materials.
- Cease providing special collection events for electronic waste and HHW.

1.3.4.6 Education

- Institute a comprehensive campaign on PAYT and curbside recycling.
- Promote the new permanent electronics/HHW collection facility.

[9] I.e., small tables or chairs. This does not include bulky items such as white goods or large furniture.
[10] This estimate is based on other communities with curbside recycling programs in states with bottle redemption requirements.

1.3.4.7 Market Development

- Promote expansion of Hawai‘i processing capacity and end-use demand for scrap tires. Opportunities include exploring expansion of scrap tire processing capabilities in O‘ahu and joint-island development of on-island demand for tire-derived aggregate in engineering applications or ground rubber in horticultural or equestrian applications.

1.3.5 Year 5

1.3.5.1 Administration

- Finalize update of ISWMP.

1.3.5.2 Collection

- Begin collecting pre-consumer food waste from commercial generators.

1.3.5.3 Bioconversion

- Begin operating centralized composting facility.

1.3.5.4 Recycling

- Evaluate automated collection of recyclables and single stream processing.

1.3.5.5 Electronics/HHW

- Ban the disposal of electronics/HHW.

1.3.5.6 Education

- Educate generators on the electronics/HHW ban.

1.4 Upstream Diversion Quantities

Table 1-1 shows the estimated quantity of materials that will be annually diverted as a result of implementing the ISWMP. Assumptions for these upstream diversion estimates are shown in the footnotes of Table 1-1. These assumptions represent performance parameters based on similar types of programs implemented in other communities.

Table 1-1
Increased Upstream Diversion Quantities
(TPY)

Action Item	YR 1	YR 2	YR 3	YR 4	YR 5
Promote Aloha Shares [1]	30	32	33	35	37
Establish Electronics Collection Event [2]	45	46	46	47	48
Ban Commercial Corrugated [3]		3,190	3,344	3,506	3,675
Ban Commercial Green Waste [4]		1,607	1,685	1,766	1,852
Increase Service Levels at Existing Transfer Stations [5]					
Add Drop-Off Site at Kapaa, Hanapepe, Lihue Transfer Stations [6]	839	853	868	883	898
Begin Collecting Pre-Consumer Food Waste [7]					1,718
Provide Residential Curbside Recycling Program with PAYT [8]				3,520	3,580
Enhance Program for Recycling at Special Events [9]	2	2	2	2	2
Implement Tourist Recycling [10]	270	274	279	283	288
Collect Green Waste Curbside in Lihue [11]	1,300	1,322	1,345	1,368	1,392
Collect Green Waste Curbside in Kapaa and North Shore [11]		3,853	3,920	3,988	4,056
Collect Green Waste Curbside in Poipu and West Side [11]			2,991	3,043	3,095
Increase Business Recycling [12]		237	248	260	273
Allow small businesses and farmers to use the HHW event [13]		159	161	164	167
Redemption program matures and improves [14]	2,142	2,179	2,217	2,256	2,294
Additional Upstream Diversion	4,628	13,754	17,139	21,121	23,375
Baseline Upstream Diversion[15]	29,170	29,680	30,180	30,690	31,200
TOTAL Upstream Diversion	33,798	43,434	47,319	51,811	54,575

1Promote Aloha Shares program- 15% of commercial durables will be diverted from landfill disposal.
2 Establish an electronics collection event- Assumes 5% of households participate and each participant brings 75 pounds of materials.
3 Ban commercial Old Corrugated Cardboard (OCC) - Assumes 90% of OCC is delivered by large haulers and 70 percent of the OCC is recovered from them.
4 Ban commercial green waste. Assumes 70% of commercial green waste would be diverted.
5 Increase service levels at existing transfer stations – The additional diversion tonnage that this will generate is accounted for in other diversion strategies, such as ban commercial OCC.
6 Provide drop-off sites at designated transfer stations – Assumes 10% of the solid waste delivered to these facilities will be diverted as recyclable materials.
7 Begin collecting pre-consumer food waste. Assumes 25% of commercial food waste would be diverted.
8 Provide curbside recycling with PAYT. Assumes 70% of households will participate and 400 lbs/hh/month. This poundage estimate is based on communities in states with bottle redemption programs and separate green waste collection.
9 Enhance program for recycling at special events – Assume 0.6 pounds per participant
10 Implement tourist recycling. Assumes an additional 1% of newsprint, magazines, PET Bottles, HDPE containers, aluminum cans and glass bottles will be recovered from tourists.
11 Collect green waste curbside. Assumes 90% of residential green waste that is currently disposed will be diverted .
12 Increase business recycling. Assumes an additional 20% of high grade office paper, mixed paper, non redemption glass bottles, plastic containers, and aluminum, and non-treated wood would be recovered.
13 Allow small businesses and farmers to use the HHW event. Assumes 50% of commercial HHW would be diverted.
14 Redemption program matures and improves. Assumes 80% of bottle bill materials can be diverted from the Landfill.
15Assmumes the per capita upstream diversion rate remains constant. Increased upstream diversion quantities due to increased population, tourists and commercial establishments.

Table 1-2 estimates the incremental costs and revenue of implementing the identified diversion programs. The information in the table below represents planning level cost estimates. Actual program costs upon implementation may vary.

Table 1-2
Incremental Collection and Upstream Diversion Costs
(TPY)

Action Item	YR 1	YR 2	YR 3	YR 4	YR 5
Increased Staff/Benefits [1]	$269,200	$288,000	$308,200	$329,800	$352,900
Conduct Operational Efficiency Study	$100,000	$0	$0	$0	$0
Educate Residents on Automated Collection then PAYT	$10,000	$5,000	$5,200	$25,000	$6,000
Purchase Automated Carts [2]	$396,300	$396,300	$396,300	$396,300	$396,300
Replace Packer Trucks with Automated Vehicles [3]	$120,000	$60,000	$61,800	$63,700	$65,600
Operate Automated Collection [4]	-$93,200	-$199,500	-$320,300	-$342,700	-$366,700
Provide Curbside Green Waste Collection [5]	$279,600	$598,600	$960,900	$1,028,200	$1,100,200
Process Additional Green Waste[6]	$65,000	$261,000	$432,000	$453,000	$474,000
Promote Backyard Composting	$30,000	$1,030	$32,000	$1,090	$34,000
Conduct Market Analysis for Compost	$0	$0	$50,000	$0	$0
Promote Aloha Shares	$500	$520	$540	$560	$580
Establish Electronics Collection Event [7]	$60,000	$61,800	$63,700	$65,600	$67,600
Increase Service Levels at Existing Drop Bin Sites [8]	$75,000	$77,300	$79,600	$82,000	$84,500
Add Drop-Off Site at Kapaa, Hanapepe, Lihue Transfer Stations [9]	$120,000	$123,600	$127,300	$131,100	$135,000
Begin Collecting and Processing Pre-Consumer Food Waste [10]	$0	$0	$0	$0	$330,000
Provide Residential Curbside Recycling Program with PAYT [11]	$0	$0	$0	$3,455,900	$3,510,900
Establish Program for Recycling at Special Events	$0	$5,000	$1,500	$1,550	$1,600
Implement Tourist Recycling	$0	$25,000	$25,800	$26,600	$27,400
Institute Innovative Recycling Grant	$0	$25,000	$25,800	$26,600	$27,400
Develop Permanent HHW/Electronics Facility[12]	$0	$0	$42,100	$42,100	$42,100

Table 1-2
Incremental Collection and Upstream Diversion Costs
(TPY)

Action Item	YR 1	YR 2	YR 3	YR 4	YR 5
Upgrade Puhi Metals[13]	$47,400	$47,400	$47,400	$47,400	$47,400
Additional Recycling Education[14]	$15,000	$15,500	$16,000	$16,500	$17,000
Incremental Collection and Diversion Costs	$1,494,800	$1,791,550	$2,355,840	$5,850,300	$6,353,780
Baseline Collection and Diversion Costs[15]	$4,330,500	$4,520,300	$4,720,100	$4,930,300	$5,151,800
Total Costs to County	$5,825,300	$6,311,850	$7,075,940	$10,780,600	$11,505,580
Revenue from Commercial Collection[16]	$10,800	$11,300	$11,900	$13,800	$14,500
Revenue from Residential Collection Fee[17]	$3,513,600	$3,571,200	$3,628,800	$3,686,400	$3,744,000
Households[18]	24,400	24,800	25,200	25,600	26,000
Total Cost to County Per Household Per Month	$19.90	$21.21	$23.40	$35.09	$36.88
Net Cost to County Per Household Per Month	$7.86	$9.17	$11.36	$23.05	$24.83

[1] Increased staff/benefits. Assumes two new employees.
[2] Purchase automated carts. Assumes 30,000 carts at $100 each. Financed at 5% for 10 years.
[3] The cost difference associated with replacing packer trucks with automated vehicles.
[4] Operate automated collection. Assumes decreasing crew size by one each time a route is automated.
[5] Provide curbside green waste. Assumes a 3 person crew but one crew member will be shifted from automated refuse routes. Assumes that the County will use manual packer vehicles that were displaced with automated collection vehicles.
[6] Process additional green waste. Assumes processing fee of $50 per ton and inflated 3% annually.
[7] Provide electronics collection event. Based on costs from other Hawai'i counties.
[8] Double the number of pulls at Hanalei Transfer Station, Kapaa, K-Mart Parking Lot in Lihue, Brennecke's Beach Broiler in Poipu, and Eleeele Shopping Center.
[9] Add more drop-off sites. Assumes that each additional drop-bin site costs $40,000 YR 1.
[10] Collect and process pre-consumer food waste. Assumes one collection route and a processing fee of $50 per ton and inflated at 3% annually.
[11] Provide curbside recycling. Assumes 70% of households participate and fee is $15.00 per month that is inflated at 3% annually.
[12] Develop permanent HHW/electronics facility. Assumes $300,000 financed for 10 years. Does not include land acquisition or operations costs.
[13] Upgrade Puhi Metals. Assumes purchasing land and installing monitoring wells. Annual debt costs, financing at 5% for 20 years.
[14] Additional Education Costs. Expenses associated with conducting focus groups and implementing outreach strategies to address barriers to participating in upstream diversion programs.
[15] Baseline Costs are the costs associated with current collection and upstream diversion activities with an average annual escalation rate of approximately 5%.
[16] Based on historical commercial collection fee and increasing the number of County commercial customers.
[17] Based on $12 per household per month.
[16] Includes approximately 75 County commercial customers.

1.5 Upstream Diversion Impacts on Solid Waste Management Infrastructure

Through the implementation of these upstream diversion programs, the diversion rate is projected to increase from approximately 24 percent to 35 percent by 2012 through the implementation of these programs.

However, as shown in Table 1-3, the overall quantities of solid waste that require management through a solid waste facility will continue to increase due to the level of population growth and commercial development that is projected by the 20-year General Plan for Kaua'i (2020 General Plan), which has a direct impact on the quantity of waste that will be annually generated.

Table 1-3
Waste Management Quantities

Year	De Facto Population[1]	Generation Rate (lbs/capita/ day)[2]	Generation[3] (TPY)	Upstream Diversion Rate (lbs/capita/ day)	Upstream Diversion (TPY)[4]	Final Management (TPY)[5]	Upstream Diversion Rate[6]
YR 1	91,900	8.04	134,840	2.02	33,798	101,042	25.07%
YR 2	93,500	8.20	139,990	2.55	43,434	96,556	31.03%
YR 3	95,100	8.38	145,520	2.73	47,319	98,201	32.52%
YR 4	96,700	8.57	151,240	2.94	51,811	99,429	34.26%
YR 5	98,300	8.77	157,310	3.04	54,575	102,735	34.69%

[1] De Facto Population equals permanent residents plus daily visitors.
[2] Generation rate is projected to increase 2.27 percent annually due to commercial development.
[3] Generation is equal to De Facto Population times generation rate.
[4] Diversion is equal to De Facto Population times recycling rate.
[5] Final management is equal to generation minus recycling.
[6] Diversion rate is equal to recycling divided by generation.

To manage this waste that is not reduced or recycled through the above programs, the County will continue to use an infrastructure comprised of transfer stations, and in the short term, the Kekaha Landfill. Beginning in YR 5, additional solid waste will be diverted from disposal through the development of a Waste-to-Energy (WTE) facility. The waste that cannot be diverted through upstream diversion or WTE will be disposed at a new, subtitle D landfill. Details on transfer, energy recovery, and disposal infrastructure are provided below.

1.5.1 Transfer Stations

The four existing waste transfer stations play an important role in the County's waste management system, serving as a link between a community's waste collection program and a final disposal facility. One reason the County uses transfer station is to reduce the cost of directly transporting waste to disposal facilities. The transfer stations also allow residents to properly dispose of materials on days other than their scheduled collection days, and green waste may also be delivered there. Businesses may use the transfer stations for a nominal fee. Overall, the existing system offers extensive convenience to Kauai residents and businesses.

During July 2006, a comprehensive site assessment was conducted at the four existing transfer stations. Based on R. W. Beck's observations and recommendations, the County will complete the following action items optimize the performance of the transfer stations:

- Add signs along approach routes;
- Update entrance signs;
- Consider adding video surveillance to deter illegal dumping;
- Improve traffic circulation;
- Provide drop-off recycling at the Hanapepe, Kapaa and possibly Lihue transfer stations;
- Modify green waste drop-off and processing system to provide more space for recycling drop-bins;
- Renovate compactor transfer station and upgrade to top trailer loading; and
- Repair and upgrade Transfer Station at Lihue.

The County may need to construct a new transfer station in the Koloa-Poipu-Kalaheo Planning District. The solid waste quantity projections through 2020 indicate this planning district will have the highest growth rate on the island. However, the waste delivery rate at the Hanapepe Transfer Station would likely be reduced if County develops a new transfer station in the Koloa-Poipu-Kalaheo Planning District. Thus, further evaluation is necessary.

The County may consider siting a WTE facility in Lihue or Koloa-Poipu-Kalaheo planning districts because these two planning districts are centrally located with respect to the quantities of solid waste generation on the island (i.e., centroid). If a central solid waste processing facility is located in one of these two planning districts, the County would not likely construct a new transfer station in Koloa-Poipu-Kalaheo Planning District, and may reduce or eliminate operation of the Kapaa and Lihue Transfer Stations. The new central processing facility could include a convenience center for residents to deliver solid waste, green waste, or special wastes. These changes would increase the efficiency of the County's transfer operations.

The County plans to finance the costs to upgrade the four transfer stations. The Kapaa transfer station upgrade would be initiated in 2008 and the other facility upgrades are planned for subsequent years within the five year planning period. The annual cost to the County for this debt, as well as the baseline costs associated with the transfer stations is shown in Table 1-4.

Table 1-4
Transfer Station Costs

Action Item	YR 1	YR 2	YR 3	YR 4	YR 5
Upgrade Transfer Stations[1]	$330,200	$330,200	$540,400	$756,900	$979,900
Baseline Transfer Station Costs[2]	$2,396,600	$2,167,300	$2,294,300	$2,429,600	$2,573,600
Total Costs	$2,726,800	$2,497,500	$2,834,700	$3,186,500	$3,553,500
Projected Revenues[3]	$18,400	$18,600	$18,800	$19,700	$20,400
Households[4]	24,400	24,800	25,200	25,600	26,000
Total Cost to the County Per Household Per Month	$9.31	$8.39	$9.37	$10.37	$11.39
Net Cost to the County Per Household Per Month	$9.25	$8.33	$9.31	$10.31	$11.32

[1]Transfer Station Costs reflect annual debt service based on financing for 10 years and an annual interest rate of 5% for the proposed upgrades for the four facilities.
[2] Baseline Costs are the costs associated with current transfer station operations with an average annual escalation rate of approximately 6%.
3 Based on Historical Transfer Station Tipping Fees and Commercial Collection Fees
4 Includes an average number of 75 commercial accounts.

1.5.2 Kekaha Landfill

The Kekaha Landfill (Landfill) is located on the leeward coastline of Kaua‘i near the town of Kekaha. According to the Landfill operator, Waste Management of Hawaii, Inc. (WM), and its 2006 Site Data and Report Summary, the remaining permitted airspace of the Landfill is 384,500 cubic yards as of May 19, 2006. In order to increase the Landfill’s capacity, the County is currently applying for a northwest horizontal expansion of the Phase II area.

It is estimated the northwest horizontal expansion would increase the remaining airspace of the Landfill by approximately 370,000 cubic yards. In addition to the completion of the northwest horizontal expansion, the County has also considered the possibility of expanding the Phase II landfill to the southwest over the northeast sideslope of the closed Phase I landfill (i.e., piggy-back over the unlined landfill). If the Phase I sideslope expansion is completed in conjunction with the northwest horizontal expansion, it would add approximately 350,000 cubic yards of airspace for a total Phase I and Phase II expansion volume of 720,000 cubic yards. The remaining permitted capacity options are summarized in the Table 1-5 below.

Table 1-5
Airspace Utilization

	Additional Expansion Volume (CY)	Remaining Capacity (cy)	Estimated Closure Date
Current Permit	N/A	384,500	December 2008
Northwest Horizontal Expansion[1]	370,000	754,500	February 2011
Southwest Horizontal Expansion Over Phase 12	350,000	1,104,500	January 2013

Assumptions:

Projected rated of waste increase is 4.6% per year.
Airspace Utilization Factor (AUF) = 1,300 lbs/cubic yard.

Notes:

[1] Assumes a 200-foot horizontal expansion to the northwest.
[2]Assumes a southwest horizontal expansion over the northeast sideslope of the Phase I area (i.e., piggy-back over unlined landfill), completed in conjunction with the northwest horizontal expansion.

1.5.2.1 New Subtitle D Landfill

Even if the County significantly reduces reliance on landfill disposal through upstream diversion activities such as green waste composting and a WTE facility, a new, Subtitle D landfill will still be required. The role of this landfill will be to manage the ash and by-pass waste from the WTE facility. By-pass waste includes the non-combustible County-collected solid waste, construction and demolition debris and commercially-collected solid waste that can not be processed at the WTE facility (unprocessable Waste). Unprocessable waste is typically bulky items, such as large durables and white goods, and waste that can not be combusted, such as concrete. In addition, if Kaua'i were to experience a significant man-made or natural disaster, the WTE facility (Section 1.5.3) may not be able to handle the significant increase in waste material or may not be able to operate because of energy limitations. Therefore, to assure that adequate disposal capacity is available, the County will begin siting a new, Subtitle D landfill in YR 1 of the ISWMP to facilitate it being able to receive waste before the Kekaha Landfill is closed. Since a significant portion of disaster debris could be comprised of organic materials, the County will attempt to site the facility in close proximity of a composting facility.

Initially, a 5-acre lined landfill will be constructed. The initial cell will consist of one, 2-acre cell for separate disposal of ash and one, 3-acre cell for by-pass waste. Landfill expansions occur approximately every 5 years thereafter. The lined landfill area will expand to a total of 8 cells over 20 acres during the 20-year life of the facility. The total facility size, including a 500 foot buffer, is 86 acres

During the first year of operation, 2013, it is estimated that the new landfill will receive approximately 9,000 tons of by-pass waste and 10,000 tons of ash. By 2018, the end of the life for the first cells, it is estimated that the facility will receive 11,000 tons of by-pass waste and non-combustible construction and demolition waste, and 15,000 tons of ash.

The cost associated with operating, expanding and closing the Kekaha Landfill and developing a new, Subtitle D landfill are shown in Table 1-6.

Table 1-6
Landfill Costs

Action Item	YR 1	YR 2	YR 3	YR 4	YR 5
Expand Kekaha Landfill[1]	$106,400	$764,000	$929,000	$929,000	$1,758,100
Baseline Kekaha Landfill Costs[2]	$5,145,200	$5,270,900	$5,528,700	$5,826,800	$6,159,800
Develop new Subtitle D Landfill[3]					$979,416
Operate/Maintain New Subtitle D Landfill[4]					$1,064,000
Total Costs	$5,251,600	$6,034,900	$6,457,700	$6,755,800	$7,917,900
Kekaha Landfill Revenues[5]	$2,554,400	$2,589,400	$2,617,800	$3,023,000	
New Subtitle D Landfill Revenues From Commercial Haulers[6]					$737,300
New Subtitle D Revenue From WTE Facility[7]					$1,373,616
Total Revenues	$2,554,400	$2,589,400	$2,617,800	$3,023,000	$2,110,916
Households[8]	24,400	24,800	25,200	25,600	26,000
Total Cost to the County Per Household Per Month	$17.94	$20.28	$21.35	$21.99	$25.38
Net Cost to the County Per Household Per Month	$9.21	$11.58	$12.70	$12.15	$18.61

[1] Expansion of Kekaha Landfill costs reflect annual debt based on financing for 20 years and an annual interest rate of 5%.
[2] Baseline Costs are the costs associated with current landfill operations with average annual escalation rate of approximately 5%. Includes annual contribution to County reserve fund specifically created to pay for the closure of the Kekaha Landfill.
[3] Development costs for the new, Subtitle D landfill reflect annual debt based on financing for 20 years and an annual interest rate of 5%. Development costs do not include land acquisition.
[4] Operating costs are based on $49 per ton and 19,000 tons of waste.
[5] Landfill Disposal Revenues based on estimate of annual average growth in disposal quantities of commercial and private hauler direct-haul tonnage. Assumes a 10% rate increase in all rates in YR1 and YR 4, assuming rates are increased to reflect annual inflation of approximately 3.0% per year.
[6] Revenues from new, Subtitle D landfill based on $101 per ton tipping fee and approximately 5,000 tons of construction and demolition debris and 2,300 tons of unprocessable waste collected by commercial haulers.
[7] Revenues from new, Subtitle D landfill based on $101 per ton tipping fee and approximately 13,600 tons of by-pass waste and ash from the WTE facility.
[8] Includes approximately 75 commercial accounts.

1.5.3 Waste-To-Energy Facility

To maximize landfill diversion, the County will develop a mass burn WTE Facility that will convert approximately 90 percent of incoming waste into energy. The unprocessable waste and processing residue (ash) will each be disposed at the new Subtitle D landfill, with dedicated cells for unprocessable waste and ash.

Initial sizing of the WTE facility is for receipt of only County-collected solid waste. Sizing the WTE facility for this capacity is because there is no existing agreement between the private waste haulers and the County to deliver commercially-collected waste to a WTE Facility. However, if the private waste haulers enter into a public/private partnership with the County before the facility is designed, capacity may be expanded to accommodate the overall waste stream. If both private- and public-collected solid waste is delivered to a WTE facility, the County may consider adding a mixed waste stream processing facility. In addition, the receipt of additional quantities of materials offers greater economies of scale and would reduce the per tons costs at the WTE.

If the private sector does not enter into a public/private partnership with the County, it will be the responsibility of the private waste haulers to identify adequate long-term disposal options.

Based on projected 2013 County-collected solid waste quantities of approximately 45,000 tons, operating and financial conditions associated with the WTE are shown in Table 1-7.

Table 1-7
WTE Facility for
Only County-Collected Disposed Waste

2013 Processed Waste Receipts	40,500 tons
Development Costs for WTE	$45.3 to $50.7 million
2013 Energy Produced	18,200 – 20,200 MWh
2013 Energy Revenue from WTE facility	$2.5 to $2.8 million
2013 Tipping ($/ton) (includes offset from sale of energy)	$123 to $141
Average Total Cost to the County Per Household Per Month	$27.67
Average Net Cost to the County Per Household Per Month	$19.05
Land Requirements	6 - 8 acres for the WTE facility.

1.5.3.1 WTE Assumptions

- WTE Processing Capacity:
  - Approximately 90 percent by weight of the waste is received and recovered;
  - 85 percent annual facility availability factor;[11]
  - At the 200-tpd rated capacity, the WTE facility will combust a maximum of 62,050 tons per year with the assumed availability factor; and
  - In 2013, the WTE facility will combust approximately 40,500 tons.
- Capital "Hard" Cost – $197,000 to $220,000 per tpd of installed capacity for 200-tpd, which is equivalent to approximately $39.4 to $44.0 million.
- WTE Project Development "Soft" Cost – 15 percent of the capital cost includes engineering, permitting, financing, air emission offsets, spare parts, start-up, and contingency, which is equivalent to $5.9 to $6.6 million.
- Operating & Maintenance (O&M) Expenses:
  - The O&M expenses include provision for labor, parts and supplies, extraordinary renewals and replacements, general and administration, operator profit, electricity, fuel, and "normal" pass-throughs such as chemicals, insurance, and utilities. This does not include property taxes, host fees, or residue disposal; and
  - WTE Facility O&M Expenses – $78 to $90 per ton of solid waste processed and combusted at 200 tpd. This is based on industry standards that have been adjusted for facility size and location.
- Unprocessable Waste and Combustion Residue Disposal:

[11] The availability factor is less than a WTE facility for all waste because this facility would only have one boiler. For a WTE facility for all waste, the facility would have two boilers. Therefore, if one boiler is not operating, the second boiler could be used.

- For planning purposes, R. W. Beck estimates that all of the "non-processables" and ash will require disposal, which is equivalent to approximately 5,000 tons of "non-processable" waste and approximately 10,000 tons of ash. This will be disposed at a New Subtitle D landfill with estimated costs of $101 per ton to develop and operate.

- Electricity Production Capability and Revenues:
  - Net electrical generation will range from 450-500 kWh per ton of waste processed, assuming solid waste with a higher heating value ("HHV") of 5,000 - 5,200 Btu per pound;
  - In 2013, the facility will deliver the excess power to Kaua'i Island Utility Cooperative (KIUC) at the energy charge of about $0.14 per kWh. This value was estimated using the Renewable Energy Technology Assessments report issued by KIUC in 2005. In 2014, KIUC will likely begin paying a capacity charge, which has the potential to reduce the tipping fee by $9 - 10 per ton;
  - Revenue from the sale of energy is estimated to be $2.5 to $2.8 million in 2013. Revenue is estimated to increase throughout the life of the WTE; and
  - In 2013, the WTE facility will sell sufficient electricity to power 1,260 to 1,400 homes per year on the island (assumes 1,200 kWh monthly usage per home).

1.6 Financial Impacts

Table 1-8 shows the estimated cost for implementing the new solid waste system for the County on a cost/household/month basis. The components of the new system include upstream diversion programs, transfer stations upgrades, new by-pass/ash landfill, and waste-to-energy facility. The total costs represent a sum of the baseline and incremental costs that are shown in Tables 1-2, 1-4 and 1-6. The total revenues include commercial collection fee and transfer station fee revenues, landfill tip fees from commercial haulers of non-combustible waste, recovered metals sales from the WTE, WTE energy sales revenue, and the proposed residential solid waste management fee revenues.

Table 1-8
Total System Costs

Line Item	YR 1	YR 2	YR 3	YR 4	YR 5
Total Cost To The County	$13,803,700	$14,844,250	$17,337,561	$22,661,342	$31,609,548
Total Revenue To The County	$6,097,200	$6,190,500	$6,277,300	$6,742,900	$8,579,279
Net Cost To The County	$7,706,500	$8,653,750	$11,060,261	$15,918,442	$23,030,269
Households	24,400	24,800	25,200	25,600	26,000
Total Cost To The County Per Household Per Month	$47.14	$49.88	$57.33	$73.77	$101.31
Net Cost To The County Per Month	$26.32	$29.08	$36.57	$51.82	$73.81

As mentioned earlier, to offset these costs to the County's general fund, the Plan recommends the implementation of a residential solid waste management fee of $12/household/month in 2009. The revenue from this fee (approximately $3.5 to $3.7 million dollars per year) is shown in Table 1-2. While the proposed fee is a fraction of the actual costs as shown in the table above, the implementation of a solid waste fee will provide a strong price signal to residents that rubbish collection and management are significant costs to the County. The implementation of this fee will also support the County's goal of establishing a solid waste enterprise fund in the long term. In 2011, after all of the County's residential customers have access to automated collection, as well as green waste and curbside recycling services, a hybrid PAYT system will be instituted.

1.7 Conclusion

By YR 5, the implementation of this Plan is projected to divert approximately 85,000 tons or more than 50 percent of the solid waste that will be generated by Kauai residents and business in 2013 (approximately 157,000 tons) from landfill disposal.

The reduction will be the result of an aggressive and comprehensive upstream diversion system that includes programs such as curbside green waste and recyclable collection and disposal bans on specified materials. For materials that cannot be recovered through upstream diversion, the County will develop a WTE facility that will convert 90 percent (approximately 40,000 tons) of incoming solid waste into energy. The County will develop a new, Subtitle D landfill to manage the approximate 19,000 tons of non-combustible waste and ash that will require landfill disposal, and debris from natural or man-made disasters. It should be noted that the County does not plan to develop new landfill capacity to manage combustible solid waste from private waste haulers after the Kekaha Landfill closes. The County will actively work

with the private waste haulers to become partners in the development of the WTE facility. If this were to occur, the potential to further reduce reliance on landfills would increase significantly and the tipping fee at the WTE facility will most likely decrease.

Beyond decreasing the quantity of solid waste that requires landfill disposal, implementation of this Plan will minimize the toxicity of the solid waste stream by expanding opportunities to recycle HHW and electronics. The Plan recommends the continued opportunity for residents to dispose of solid waste at the transfer stations without a user fee, which will deter illegal dumping of solid waste when the PAYT system is instituted.